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IS 1448-74 (1968): Methods of test for petroleum and its products, Part 74: Dryness of liquefied petroleum gases [PCD 1: Methods of Measurement and Test for Petroleum, Petroleum Products and Lubricants]

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DRYNESS OF LIQUEFIED PETROLEUM GASES

[P : 74]

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Adapted from NGPA Publication No. 2140-62

1. SCOPE

1.1 This test is intended to give an indication of the dryness of liquefied petroleum gases (LPG), commercial propane type.

2. OUTLINE OF THE METHOD

2.1 Vapours of LPG are brought in intimate contact with the cobaltous bromide colour indicator under specified conditions; dryness is indicated by observing the colour of cobaltous bromide.

3. APPARATUS

3.0 The apparatus (*see* Fig. 1) shall consist of the component parts as described in **3.1** to **3.6**.

3.1 Indicator — The indicator is essentially a device for intimately contacting a gas or vapour with finely divided cobaltous bromide under such conditions that the colour of the cobaltous bromide may be observed at all times. The indicator shall be made from suitable hexagonal brass bar and shall be finished white with nickel. Its element shall consist of a lightly-folded plug of cotton impregnated with cobaltous bromide (*see* Fig. 2). This plug of cotton shall be held in a glass tube which in turn shall be partially surrounded by a metal shield. The glass tube shall be sealed at its inlet end to a pipe fitting and at the other end to a fine capillary orifice which serves as the outlet.

3.1.1 For preparing the indicators, the cotton plug shall be shaped and sized to fit in the glass tube loosely. Each plug shall be approximately 10 mm long. After soaking in a saturated solution of cobaltous bromide, the plugs shall be placed in a test tube or flask and dried. Drying is

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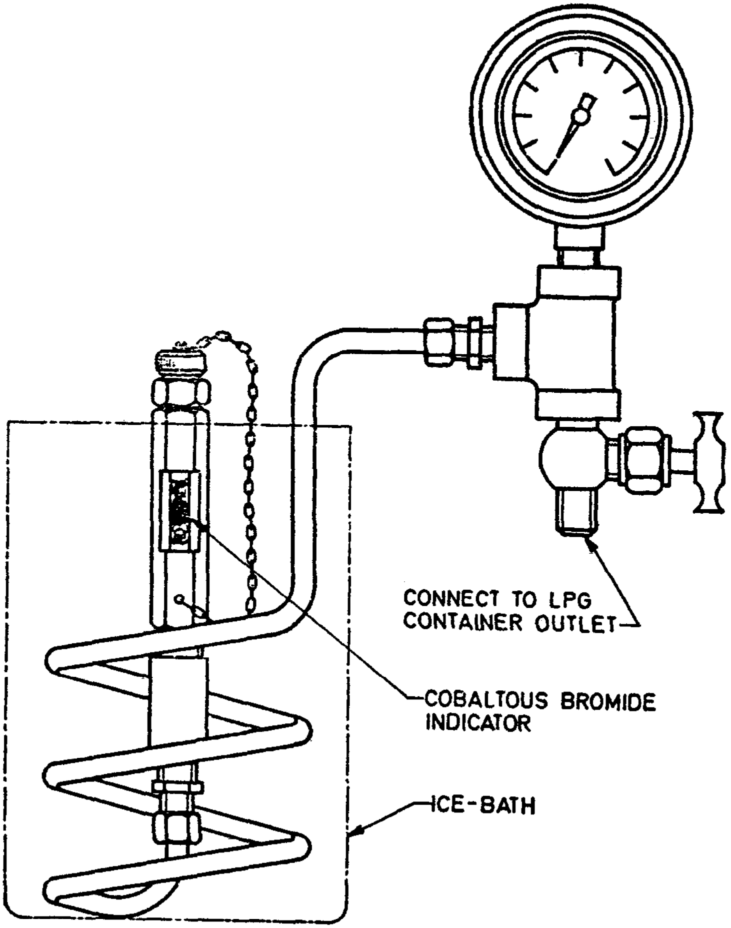
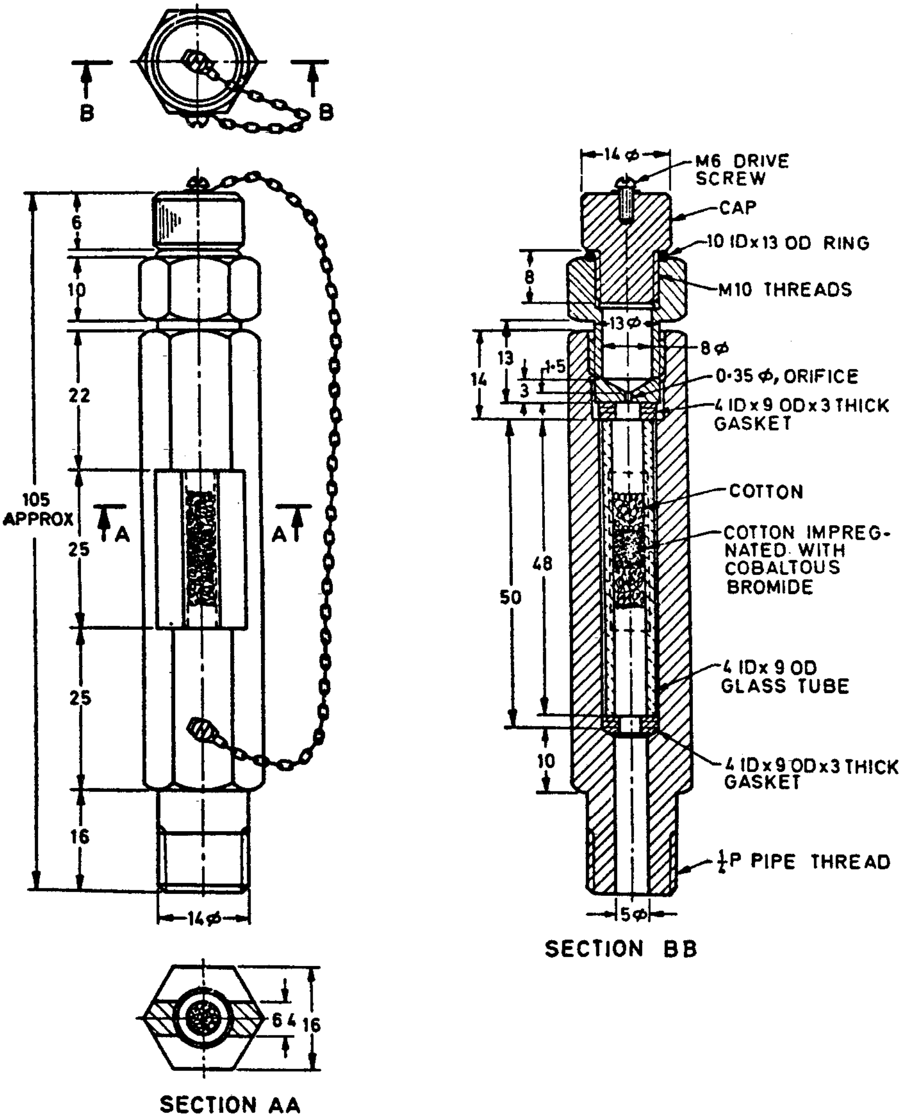


FIG. 1 ASSEMBLY OF APPARATUS FOR DRYNESS TEST OF LPG

accomplished by heating to a temperature not exceeding 100° C while simultaneously evacuating the container. When properly dried, the plugs are green or blue. They may be stored in sealed bottles or a desiccator, but preferably in a separate gelatin capsule.

3.2 Pressure Gauge — An accurate pressure gauge of suitable range and graduated in 0·1 kgf/cm^2 shall be provided.

3.3 Needle Valve — The needle valve required shall be capable of accurately controlling the flow of gas through the equipment with a minimum of adjustment.



All dimensions in millimetres.

FIG. 2 DETAILS OF INDICATOR

3.4 Ice-Bath — The ice-bath shall consist of a container filled with water and broken ice to a depth sufficient to immerse the cooling coil and all but the tip of the attached indicator. The temperature of the ice-bath shall be maintained within 0° to 1° C.

3.5 Cooling Coil — The cooling coil shall consist of at least 0·6 m of about 6 mm outside diameter copper tubing coiled so that it may be conveniently immersed in the ice-bath. The inlet of the coil shall extend well above the bath and shall be fitted with a suitable connection to accommodate the pressure gauge and needle valve. The outlet of the coil shall point upward so that when attached to the indicator it may be readily immersed up to within 12·5 mm of the tip of the indicator.

3.6 Caps or Plugs (*not shown in the figure*) — Adequate caps or plugs shall be provided for the inlet and outlet of the assembly to prevent moisture from entering the apparatus when the test is not being performed. These shall be made from suitable cylindrical brass bars and shall be finished white with nickel.

4. SAMPLING

4.1 All tests shall be conducted with the apparatus connected directly to the vapour space of the tank, tank car or tank truck containing the LPG to be tested, except in cases where local conditions do not permit. In such cases a dry sample container having a minimum capacity of 75 litres shall be used and a liquid sample of not less than 70 and not more than 80 percent of the volume of the sample container shall be obtained.

5. ASSEMBLY OF APPARATUS

5.1 Assemble the apparatus as shown in Fig. 1. The needle valve shall be attached to a vapour outlet of the LPG container by means of suitable pipe or tubing connection of minimum length.

5.2 The assembled coil and indicator shall be adjusted to a vertical position. The ice bath shall then be placed in such a position that the coil and all but approximately 13 mm of the tip of the indicator is to be immersed.

6. PRECAUTIONS

6.1 All tubing and fittings shall be absolutely dry and free from oil or foreign matter, so that the indicator is not contaminated or the results of the test obscured.

6.2 Keep the caps or plugs on the inlet and outlet of the assembly at all times when the apparatus is not in use and remove the cap on the outlet orifice only when the actual testing is in progress.

6.3 The final colour of the indicator shall be the original blue, lavender or pink. Extreme care shall be exercised in distinguishing blue from lavender colour as any change from the original blue colour indicates a marginal moisture content. For boarderline cases, it is advisable to compare the final colour of the indicator with an anhydrous indicator prepared at the same time.

7. PROCEDURE

7.1 The valve on the source of LPG to be tested shall be opened and the cap removed from the outlet of the indicator.

7.2 The needle valve (*see* Fig. 1) shall then be carefully opened until the pressure gauge registers 3·5 ± 0·1 kgf/cm^2 and shall be adjusted to maintain this pressure for the duration of the test.

7.2.1 If the container pressure is less than 3·5 kgf/cm^2, secure a sample as outlined in **4.1**.

7.3 If the original blue colour persists for 30 minutes of test exposure, the pressure shall then be reduced to 0·5 ± 0·1 kgf/cm^2 for 5 minutes.

8. REPORTING

8.1 If the original blue colour persists throughout this period (35 minutes), the material shall be reported as being ‘ dry ’ and shall be considered to have passed the test. If the colour changes to lavender or pink at reduced pressure, then the material shall be reported as being ‘ wet ’ and shall be considered not to have passed the test.

8.2 If the colour changes to lavender or pink during the 30 minutes of test exposure at 3·5 ± 0·1 kgf/cm^2 (it may occur in a few minutes), the material is either wet or the tubing and fittings contain water. To determine the cause of the colour change the pressure on the apparatus shall be adjusted to 0·3 kgf/cm^2 or less.

8.2.1 If the indicator turns blue, it may be assumed that the tubing and fittings are free of water and the material shall be reported as being ‘ wet ’.

8.2.2 If the indicator remains lavender or pink, it may be assumed that the tubing and fittings contain water. The apparatus and connections shall be dried and the test repeated.

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